

# MURDOCK APPARATUS

KNOWN FOR SENSITIVE  
SUSTAINED SERVICE



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*Catalog No. 14*

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WM. J. MURDOCK CO.  
CHELSEA, MASS.

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## **GUARANTEE**

MURDOCK APPARATUS is guaranteed against all MECHANICAL or ELECTRICAL IMPERFECTIONS. Every instrument or combination of instruments is thoroughly tested before shipment, and is guaranteed to be precisely as represented in this catalog.

## **TERMS**

Remittances should be made by Postal Money Order, Express Money Order, or New York or Boston Draft.

Goods will be shipped C. O. D., if a remittance of one-third of list price accompanies order.

## **DELIVERY**

Whenever possible, delivery will be made from stock upon receipt of order. In all cases, customers will be notified of date of shipment.

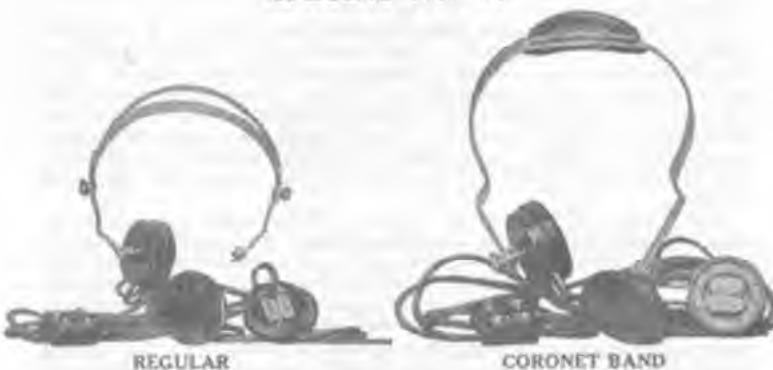
To prevent mistakes, orders should state the quantity desired, the number, and the name of instrument or set. In the absence of specific shipping directions, goods will be forwarded by the safest and cheapest route.

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## MURDOCK APPARATUS

MURDOCK WIRELESS RECEIVERS  
PRE-EMINENTLY SENSITIVE

SPECIAL NO. 55



REGULAR

CORONET BAND

**Detail:** complete double sets made in resistances of 2000 and 3000 ohms; bipolar receivers; cases, special processed hard rubber composition with lustrous and lasting finish; MURDOCK patented SOLID construction; magnets, best quality steel, in amount sufficient to guarantee dense and permanent magnetization; spool windings, enamel coated copper wire; diaphragm, thin, flexible, non-rusting and perfectly seated; cord, five foot, Mercerized, best quality; head band, nickelplated german silver, split and adjustable. Weight complete double set, 14 ounces. Shipping weight; complete double sets 1 1/4 lbs.; single set, 1 lb.; receiver only 5/8 lb.

### PRICES

Complete double set, 2000 ohms	\$4.00
Complete double set, 3000 ohms	5.00
For either complete double set with Coronet head band, add .50	
Complete single set, 1000 ohms	2.00
Complete single set, 1500 ohms	2.50
Single receiver only, 1000 ohms	1.50
Single receiver only, 1500 ohms	2.00

### READ THESE CLAIMS

The exceptionally low price which we have set for the MURDOCK SPECIAL No. 55 head sets renders important the following plain statement of facts. We can and do make the most sensitive wireless receivers in the world, selling at the prices we quote for our different styles. We believe that we can make and sell excellent receivers cheaper than any other manufacturer in the business. We claim that this SPEC-

IAL No. 55 head set cannot be duplicated by anyone at the price. We claim that this set will appeal to your eye as an especially fine-looking equipment, to your ear, as sensitive as any you can buy for double the price, and to your business instinct, as the best buy you can make anywhere. The broad guarantee of "Satisfaction or Money Back," an extra generous trial offer, and the MURDOCK reputation stand behind this set.

At \$4.00 for a complete 2000 ohm set, and \$5.00 for a complete 3000 ohm set, every wireless operator can afford to have, and positively should not go without, a pair of these truly magnificent 'phones. Buy them for extras, or for emergency use, and you will be glad to use them all the time. Buy them for your friends to listen in, and you will pass your present favorites to them. Equally good for novices or experts, supersensitive, strong, permanently adjusted, durable and efficient, the MURDOCK SPECIAL No. 55 head sets present an unrivaled value.

Don't allow yourself to be convinced that minimum weight implies maximum efficiency in wireless receivers. An ounce or two makes little difference in comfort, but it may mean a whole lot in efficiency. If light weight is obtained by skimping on magnet steel for example, the small added comfort does not begin to compensate for the loss in sensitiveness and durability. MURDOCK RECEIVERS have more good magnet steel than most wireless receivers, with the pleasing consequence that they are originally more sensitive than most, and keep that sensitiveness longer.

#### MURDOCK WIRELESS RECEIVERS

#### THE FAMOUS NO. 50



**Detail:** complete sets in a variety of resistances suitable for every possible experimental use, or for constant service in wireless stations of every character. Receivers, bipolar; cases, hard rubber composi-

tion, patented SOLID construction, permanently adjusted; magnets, highest grade steel obtainable; diaphragm, thin, non-rusting, perfectly seated close to pole pieces; cord, six foot, six tipped, green silk covered, best quality; spool windings, copper wire, enamel coated; headband, nickelized spring german silver, split and adjustable. Weight complete double sets 15 oz. Shipping weights, double sets 1½ lbs; single sets, 1 lb.; receivers only ½ lb.

#### PRICES

Resistance ohms	Receiver only	Single set	Resistance ohms	Double set
500	\$2.00	\$3.20	1000	\$5.50
750	2.50	3.70	1500	6.50
1000	3.00	4.20	2000	7.50
1500	3.50	4.70	3000	8.50

The best reputation of MURDOCK WIRELESS RECEIVERS has been built by the perfect performance of these Famous No. 50 sets during the past ten years. In that time, we have made no radical change in design or structure. Yet today they are as popular as ever and their reputation for superior sensitiveness is unchallenged. MURDOCK No. 50 sets from eight to ten years old are still in service and their owners have recorded themselves as perfectly satisfied with the working of these 'phones NOW, after years of hard use.

We want every wireless operator to buy and use MURDOCK WIRELESS RECEIVERS because with them the purchaser obtains superior sensitiveness combined with a capacity for constant and continued use without deterioration. No other receivers in their price classes can compare in real value with MURDOCK RECEIVERS.

(Judge wireless receivers by their performance for you in your station, not by advertising talk. TRY them all. We are satisfied that your verdict will favor our really good receivers.)

### MURDOCK WIRELESS RECEIVERS

#### LEADER NO. 30L

Detail: complete 2000 ohm, real wireless high resistance head set; receivers, double pole with hard rubber composition cases, patented SOLID construction; magnets, best quality steel; diaphragm, regulation wireless type, thin and flexible; head band, leather covered spring steel; cord, five foot length, mercerized finish, best quality. Weight complete double set 15 ounces. Shipping weights; double set, 1½ lbs.; single set, 1 lb.; receiver only, ½ lb.

The popularity which these receivers have enjoyed in the past, and the splendid reputation which they have earned is full testimony of their real value. In actual service, in connection with purely amateur equipment, they have aided in the establishment of long distance receiving records which would seem incredible were it not for the absolute proofs offered. These receivers compare very favorably with higher priced 'phones of our own manufacture, and are vastly superior to others offered at similar prices. We guarantee that these

'phones will deliver more sensitive, more lasting, and more satisfactory service than any obtainable anywhere at the price.



Leader No. 30L

**PRICES**

Complete double set, 2000 ohms	\$5.00
Complete single set, 1000 ohms	2.50
Single receiver only, 1000 ohms	1.75

### MURDOCK WIRELESS RECEIVERS

Are as perfect as persistent experiment and long experience in manufacturing can make them. They excel in the two most important requisites of wireless receivers, first, **sensitiveness**, and second, **dependability**.

BECAUSE the amount of magnetic material is not decreased in a misdirected effort to obtain exceptionally light weight, MURDOCK RECEIVERS are more sensitive and more dependable than others. We know, from long experience, the quality and amount of magnetic material necessary to insure perfect sensitiveness combined with lasting magnetism, and we put **that quality and that amount** into every receiver.

BECAUSE MURDOCK RECEIVERS are constructed as units with no floating or adjustable parts, they stay right all the time, and give unvarying sensitive service.

BECAUSE MURDOCK RECEIVERS are constructed with special attention to diaphragm thickness, position, and clamping, they give a characteristic strong, unmistakable signal, best adapted for every possible condition of wireless receiving.

BECAUSE MURDOCK RECEIVER spool windings consist of pure copper of high conductivity, enamel coated, they have more effective turns than receivers with other types of winding, with a consequent increase of efficiency.

BECAUSE the fittings of MURDOCK RECEIVERS are designed for comfort and service, and

BECAUSE every detail looking towards the production of perfect phones at moderate price is carefully studied and executed, MURDOCK RECEIVERS have earned and still maintain a reputation which makes them the most popular and best known instruments on the market.

The prospective purchaser of wireless phones can do no better than to TRY MURDOCK RECEIVERS. They will stand any test to which they may be put, backed by their reputation and the absolute guarantee of a manufacturing company whose product of more than a million telephone receivers implies an ability to produce unexcelled wireless phones.

#### GUARANTEE FOR MURDOCK WIRELESS RECEIVERS

We guarantee that MURDOCK WIRELESS RECEIVERS will surpass in sensitiveness any receivers of similar resistances obtainable at the same price. Fourteen days trial allowed, in competition with any other receivers. If, at the expiration of the trial, our receivers are not considered satisfactory, purchase price will be refunded immediately upon return of receivers.

#### WATCHCASE RECEIVER NO. 40



**Detail:** regular telephone type; hard rubber composition case, SOLID construction; double poles; winding, silk covered copper; resistance per receiver 80 ohms. Shipping weight  $\frac{3}{4}$  lb.

#### PRICES

Watchcase Receiver No. 40, each	\$ .80
Watchcase Receiver No. 40, with 3 foot cord, each	1.00
Watchcase Receiver No. 40, with cord and leather covered headband, each	1.50

This is a regulation telephone receiver of the best quality. As an auxiliary receiver or for use wherever low resistance is desirable, it will be found unexcelled.

## TELEPHONE RECEIVERS, PARTS AND SUPPLIES

## PRICES

	Each
Watchcase receiver No. 40, 80 ohms	\$.80
Wireless receiver No. 55, 1000 ohms	1.50
Wireless receiver No. 55, 1500 ohms	2.00
Cords, best quality mercerized finish, 3 ft. single	.20
Cords, best quality mercerized finish, 5 ft. single	.30
Cords, best quality mercerized finish, 5 ft. double	.50
Cords, best quality silk covered, 6 ft. single	.50
Cords, best quality silk covered, 6 ft. double	.80
Head bands, No. 30, leather covered, single	.50
Head bands, No. 30, leather covered, double	1.00
Head bands, No. 55, nickelled german silver, single	.75
Head bands, No. 55, nickelled german silver, double	1.00
Head bands, No. 50, nickelled german silver, single	.75
Head bands, No. 50, nickelled german silver, double	1.00
Head bands, No. 65, Coronet type, double only	1.50
Caps for all MURDOCK receivers	.25
Diaphragms, wireless type	.10
Rubber ear cushions, per pair, \$1.00	.50
Receiver connection block No. 6B	.20

## RECEIVING TRANSFORMER NO. 341



Detail: primary winding bare copper wire; secondary, silk covered copper; primary variation, single spiral spring contact, positive and selective; secondary variation, six point switch, mounted on coil head; tubes, undrinkable hard rubber composition; woodwork, dark mahogany; metal parts heavily nickelled; coupling variation, slide movement of secondary in and out of primary. Wave lengths up to 1500 meters may be tuned in connection with average antenna. Over-all size 14 $\frac{3}{4}$  x 6 $\frac{3}{4}$  x 5 $\frac{3}{4}$  inches. Shipping weight 6 $\frac{1}{2}$  lbs.

## PRICE

Receiving Transformer No. 341 .....	\$15.00
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It has been repeatedly demonstrated that this instrument is far superior in selectivity to any similar tuning device ever offered for amateur use. This is due to its splendid design and its perfect construction. It is a thoroughly built, substantial, handsome instrument, well deserving the numerous testimonials which its users have volunteered in the past. It is positively without a rival in its particular field, and its continued popularity is proof positive of the reputation which it enjoys among those who appreciate really good apparatus.

#### RECEIVING TRANSFORMER NO. 344



**Detail:** tubes, hard rubber composition, unshrinkable; coil windings, primary, bare copper, secondary, silk covered copper wire; primary variation, sliding contact; secondary, six point switch; coupling, movement of secondary to and from primary; mahogany finished base; nickelled and polished brass metal parts. Wave lengths up to 1500 meters may be tuned. Over-all size 12 x 5 $\frac{3}{4}$  x 4 inches. Shipping weight 5 lbs.

PRICE	
Receiving Transformer No. 344 .....	\$7.00

By simplification of parts and slight changes in non-essential materials, we are able to offer a receiving transformer exactly the same in electrical details as our No. 341, at less than half the price of that instrument. This instrument is, therefore, an especially fine value. In operating efficiency, it compares favorably with instruments selling at many times the price, while its appearance is in no way cheap or flimsy. It is an excellent instrument suited for most exact tuning, and is so far superior in workmanship and in materials to similar instruments offered elsewhere at low prices that there can be no comparison.

#### TUNING COIL NO. 240

**Detail:** hard rubber composition coil and ends, absolutely non-shrinkable; nickelled binding posts; bare copper wire winding, 200 turns; two sliding contacts, efficient design making positive contact; wave lengths obtainable in connection with average antenna up to 2000 meters. This instrument may be used as a loading coil, and in such use will be found extremely efficient. Size over-all 10 x 3 $\frac{1}{2}$  x 3 $\frac{1}{2}$  inches. Shipping weight 3 lbs.

The use of the double slide tuning coil affords the best means of making an efficient receiving set at a very low price. Used in con-

bination with a good-detector and a pair of head receivers, the only additional requirement for a successful receiving station is a good antenna. For those learning wireless or for those desiring the simplest



Tuning Coil No. 240

and best tuning device at a very low price, this coil is desirable. In quality of materials and in sturdiness of construction this instrument is far superior to similar devices offered at equal prices.

**PRICE**

Tuning Coil No. 240	\$3.00
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**ROTARY VARIABLE CONDENSER NO. 364**



**Detail:** maximum capacity .0005 mfd., suitable for use in secondary receiving circuits; air dielectric; plates,  $\frac{1}{4}$  in number, semi-cylindrical, mounted vertically; top and bottom, polished black hard rubber composition, side wall transparent; furnished with arrow indicator and 180 degree scale on top. Size,  $3\frac{1}{2}$  inches diameter;  $3\frac{1}{2}$  inches high; shipping weight, 1 lb.

**PRICE**

Variable Condenser No. 364	\$3.00
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This was the first really good rotary variable condenser ever offered at a low price. Since its introduction some three years ago, it has been widely sought for because its value was apparent on first examination, and its operation always justified the judgment of the pur-

chaser. It is an exceptionally handsome instrument, and its compactness lends remarkably to the ease with which it has been combined by many amateurs with complete sets. It is as efficient as it is good-looking, and its addition to any set means an improvement in operating efficiency. This condenser was designed especially for parallel use in secondary receiving circuits, and with the average receiving transformer will aid in tuning up to about 1800 meters. No better variable condenser can be purchased at such a low price.

#### ROTARY VARIABLE CAPACITOR NO. 366



**Detail:** maximum capacity .001 mfd., air dielectric; regulation type semi-circular metal plates, 63 in number, 21 movable, 22 stationary, separated 1-32 inch. Complete case and top, polished black hard rubber composition; knurled knob handle, arrow indicator, nickel binding posts, 180 degree scale. Size, 4 $\frac{1}{4}$  inches diameter; 4 inches high; shipping weight, 2 lbs.

#### PRICE

Variable Capacitor No. 366	\$4.00
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Our production of a regulation vane type air dielectric condenser at a low price was a typical Murdock accomplishment, since we offered for the first time, a condenser such as amateurs have always sought for at a price far below those which had been in force previously. This new condenser is, in spite of its low price, characterized by the qualities which have always been noted in Murdock Apparatus, namely, good materials, good design, and good construction. We believe that this condenser is superior in constructional detail and working efficiency to any on the market and offer it with our usual "money back" guarantee. In appearance it is decidedly attractive, and its sturdy construction insures lasting service. We are confident in our belief that this condenser is the cheapest and best variable condenser of this design ever offered for amateur use and unhesitatingly recommend it for such use in combination with any class of apparatus. Its capacity is such that it may be used effectively either in series with the primary or in parallel with the secondary. In addition, it is just the condenser for its effective use in a wave meter combination, if the amateur desires to wind an inductance and have the combination calibrated.

## ROTARY VARIABLE CONDENSER NO. 367



**Detail:** same construction interior as No. 366, described above. Capacity .001 mfd.; case transparent, exposing interior working of condenser. Size, 4 inches diameter, 3½ inches high; shipping weight, 2 lbs.

## PRICE

Rotary Variable Condenser No. 367 .....	\$4.00
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This condenser is precisely the same as our No. 366 in essentials. It differs merely in the case. Some prefer a condenser which shows the movements of the interior parts and this instrument is offered to satisfy this demand.

## ROTARY VARIABLE CONDENSER NO. 368



**Detail:** one-half size of No. 367; 11 movable plates, 12 stationary; interior construction similar to No. 366; transparent case; hard rubber composition top with scale. Size, 4 inches diameter, 2¾ inches high. Shipping weight, 1½ lbs.

## PRICE

Rotary Variable Condenser No. 368 .....	\$3.00
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This condenser has a capacity of .0005 mfd., and will be found suitable for use as a secondary multiple condenser for the average wave lengths. It is in every way, a handsome, splendidly operating instrument and offers the best value obtainable for the price.

**FIXED RECEIVING CONDENSER NO. 359**

**Detail:** regulation "stopping" condenser contained in a flat, hard rubber composition base with screw holes and nickel-plated binding posts. Over-all size, 4½x2x1½ inches. Shipping weight ¾ lb.

**PRICE**

<b>Fixed Receiving Condenser No. 359</b>	.....	<b>\$0.80</b>
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This is a "stopping" condenser of correct capacity for use in detector-telephone circuits. In form it is most convenient. In appearance and in size it is desirable. It is especially valuable for combination in-mounted or cabinet sets, where either compactness or good looks are desired.

**FIXED RECEIVING CONDENSER NO. 358**

**Detail:** regulation "stopping" condenser moulded into a hard rubber composition case, black finish, with nickel-plated binding posts. Over-all size, 2½x1½x1¾ inches. Shipping weight ¾ lb.

**PRICE**

<b>Fixed Receiving Condenser No. 358</b>	.....	<b>\$0.50</b>
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The demand for a fixed receiving condenser of moderate capacity, excellent construction, good looks, and perfect reliability has resulted in the design and manufacture of this "pony" type. It is quite as efficient, capacity considered, as larger instruments of the same general structure, and is without question a good value at the price.

## LOADING INDUCTANCE NO. 510



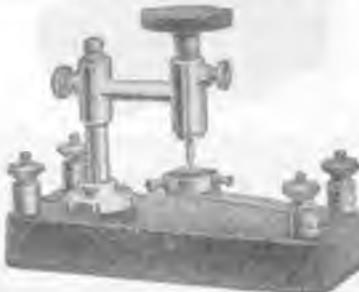
**Detail:** loading coils contained in compact flat base and tapped to seven active contact points, with sliding contact of regular switch style; each active point represents approximately 400 meters; base, polished hard rubber composition; all metal parts heavily nickel plated. Size over-all 4½ x 2 x 1½ inches. Shipping weight, 3½ lb.

## PRICE

Loading Inductance No. 510 .....	\$3.00
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With the increase of wave lengths which has become so common in modern practice of wireless, a need of building up the period of the primary of receiving transformers to wave lengths of 3000-4000 meters was apparent. The loading inductance illustrated here fills this need perfectly. Used in connection with the primary of the average receiving transformer, waves up to 4000 meters in length may be perfectly tuned. The instrument is easily connected and operated. Its excellent construction assures perfection of service and its handsome appearance adds to the dignity of any station.

## SILICON DETECTOR NO. 322



**Detail:** Genuine patented Silicon Detector, manufactured under license from owners of patents covering the use of silicon as a wireless telegraph detector. Hard rubber composition base; all metal

parts heavily nickel plated; element suspended on spring strip; adjustments, vertical or horizontal, in any degree and to numerous positions; supplied either with or without a fixed condenser of suitable capacity sealed in the base. No battery required. Size over-all,  $4\frac{1}{2} \times 2 \times 3\frac{1}{4}$  inches. Shipping weight, 1 lb.

## PRICE

Silicon Detector No. 322 only, (no condenser) .....	\$4.50
Silicon Detector No. 322 (with fixed condenser) .....	5.00

The silicon detector has always been a favorite among amateurs for general service. It gives extremely sensitive results with the least bother and is superior to any other mineral detector in point of quick adjustment to some sensitive spot. The Murdock Silicon Detector is an especially handsome and serviceable instrument. Its range of adjustment and its scientific construction assures excellence of service quite out of the ordinary.

This is the first silicon detector licensed for amateur use which has ever been offered at a low price, and in the past has been added to thousands of amateur stations. There still remains the opportunity to other experimenters of adding this magnificent licensed detector to their outfit, either as a first detector or as an auxiliary. We are confident that this detector will prove of exceptional sensitiveness, knowing as we do, its long distance records achieved in the last few years. No better mineral detector can be bought. We do not sell silicon separately.

## MOLYBDENITE DETECTOR NO. 220



**Detail:** patented detector employing the element molybdenite-hard rubber composition base; nickel plated parts; element supported in wide spring strip; element holder is movable, so that all parts of surface may be brought into contact; adjustment, vertical with fine

thread graduation; no battery required for efficient operation. Over-all size,  $4\frac{3}{8} \times 2 \times 3\frac{1}{2}$  inches. Shipping weight,  $\frac{3}{4}$  lb.

**PRICE**

<b>Detector No. 220 only, (no condenser) . . . . .</b>	<b>\$3.00</b>
<b>Detector No. 220 (with fixed condenser) . . . . .</b>	<b>3.50</b>

This is an excellent instrument at an extremely low price for a genuine patented detector, manufactured under license from owners of patents. It is sturdy in construction, simple and clean in operation and possesses the desirable feature of stable adjustment under the influence of strong signals. This latter quality makes it a desirable auxiliary for more delicate detectors when working with nearby stations of fairly strong power. Supplied either with or without our fixed condenser No. 359 sealed in the base.

**DETECTOR STAND NO. 324**



**Detail:** polished hard rubber composition base; nickel-plated binding posts; specially designed spring contact; spring element holder; fine vertical adjustment. **No element supplied.** Over-all size  $2\frac{1}{2} \times 1\frac{1}{2} \times 2$  inches. Shipping weight  $1\frac{1}{2}$  lb.

**PRICE**

<b>Detector Stand No. 324 . . . . .</b>	<b>\$0.50</b>
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This detector stand is designed to serve efficiently the needs of those who do not care to expend a large amount for their apparatus, or for those who desire to have an auxiliary detector for emergencies or for special experiment. It is compact in size, extremely well made, and undeniably simple in operation. Offered at a very low price, it should be the choice of those who desire to secure a good detector stand for a moderate sum.

**DE FOREST AUDION DETECTORS**

For the convenience of our customers, we have undertaken the sale of DeForest Audion Detectors in several desirable styles. The

audion detector is, without question, the most sensitive form of wave detecting device yet discovered. In addition to its marvellous sensitiveness, it possesses the singularly desirable quality of permanence of adjustment. These two qualities combined afford to wireless experimenters in general, a solution of all detector troubles, for the audion with its unexcelled sensitiveness and its practically stable adjustment gives constant, reliable, sensitive service, "always on the job."

For the information of those who are not familiar with the audion, the following brief summary of its operation is offered. The audion is connected as any detector is placed in the receiving circuit, by wires leading from the tuner to the posts on the audion marked "tuner." The telephone receivers are connected to the posts marked "telephones." A source of direct current, either a four volt storage battery or three dry cells in series, is connected to the filament circuit of the bulb at the posts marked "AA." The rheostat is then manipulated until the filament glows, but care should be taken that excessive current be not passed through the filament. Signals will then be received if the receiving apparatus be adjusted as usual with any form of detector. The high voltage switch of the audion may then be regulated to secure the best results. When these adjustments have been made, the audion may be left unchanged during use. The filament should, of course, be left unlighted when the instrument is not in use. Powerful impulses from nearby stations may momentarily reduce the sensitiveness of the audion, but its self-restoring qualities will immediately bring about a return of the original condition.

All audion detectors listed here are licensed under the DeForest patents.

#### AUDION DETECTOR RJ4



**Detail:** Case, polished mahogany; metal parts, lacquered brass; five contact points for high voltage adjustment; porcelain base rheostat; all binding posts and connection points plainly marked. This equipment includes the high voltage battery, but no low voltage battery.

Bulb regularly furnished, "S" grade, tungsten filament. Over-all size, 11x7 $\frac{1}{2}$ x5 $\frac{1}{4}$  inches. Shipping weight, 10 lbs.

## PRICE

Audion Detector RJ4 .....	\$18.00
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The RJ4 Audion is licensed for amateur use only. It has been decidedly improved over the original amateur audion, and is now deservedly the most popular amateur detector in use.

## AUDION DETECTOR RJ5



**Detail:** Case, mission finished oak; all metal parts nickel plated; switch knobs, genuine hard rubber; high voltage control has six variations, permitting closest regulation; porcelain base rheostat. Bulb has two filaments which may be horned alternately or one may be held in reserve, thus actually affording two audions in one. High voltage battery contained in case, but no low voltage battery furnished at this price. Over-all size, 9x9x7 inches. Shipping weight, 12 lbs.

## PRICE

Audion Detector RJ5 .....	\$25.00
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For those who desire the best audion obtainable at a low price for amateur use, we recommend the RJ5. It is a splendidly built instrument, is fitted throughout with high grade accessories, and every correct connection is plainly indicated.

## AUDION DETECTOR TYPE PN



**Detail:** Case, waxed piano finish oak; front panel, polished hard rubber composition, special process; enclosed rheostat; metal parts heavily nickel plated; high voltage switch gives nine variations all marked; all connections plainly marked on attached plates; two bulbs, with two filaments each, giving virtually four detectors; high voltage battery contained in case. Over-all size, 9x8 $\frac{1}{4}$ x7 inches. Shipping weight 12 lbs.

## PRICE

Audion Detector Type PN .....	\$50.00
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The PN Type Audion is a regulation commercial detector licensed by the DeForest Company for such use. Some of the best equipped amateur stations are using this detector with uniform success. For those desiring the satisfaction of possessing the absolute best, this detector will be especially suitable, for in constructional detail and in operating efficiency it cannot be excelled.

## SINGLE STEP AUDION AMPLIFIER NO. PJ1

**Detail:** Case, piano finish oak; front panel, highly polished black hard rubber composition; switch arms, contact points etc., nickel plated; bulb, special amplifier type, two filaments to be used at the same time. Note:—Amplifier bulbs differ from the regulation audion bulbs, and regular bulbs cannot be used on amplifiers. Over-all size, 9 $\frac{1}{2}$ x10x7 inches. Shipping weight, 20 lbs.

The audion amplifier is designed for operation in combination with any wireless detector but its use in connection with a regulation audion detector will produce perfect results. The amplifier will increase the intensity of signals received on any wireless set from 5 to 10 times

original volume, thus making possible an increase in receiving range by building up weak signals from distant stations to readable volume and bringing in many signals which without the amplifier would be inaudible. Moreover, the increase in volume of signals will permit a looser coupling of the receiving set, with consequent elimination of



**Single Step Audion Amplifier No. PJ1**

interference. Its connection and operation are extremely simple and its marvellous power of intensifying the feeblest impulses make it especially desirable for amateurs who desire to do extra long distance receiving. When used with an audion detector, two sources of low voltage current must be had, one for the audion, the other for the amplifier. This instrument is licensed for amateur use.

**PRICE**

**Single Step Audion Amplifier No. PJ1** ..... \$65.00

**RENEWAL AUDION BULBS**

Audion bulbs are furnished separately for renewals only, for audions purchased from us. No renewals can be made except upon exchange of an old bulb complete, or upon return of the wing and grid system of a broken bulb.

PRICES	Each
"S" grade, tungsten filament	\$3.50
"X" grade, tungsten filament, extra sensitive	5.00
"S" grade, Hudson filament	3.50
"X" grade, Hudson filament, extra sensitive	5.00

All standard audion detectors as listed are fitted with "S" grade tungsten filament bulbs. Other grades of bulbs may be supplied with instruments on original order at the difference in price between the "S" and "X" grades as shown in renewal prices.

## POTENTIOMETER NO. 530



**Detail:** Resistance rod, 400 ohms total; variation by suitable steps, metal contact on brass rings, certain and positive changes; base, hard rubber composition; nickelated binding posts. For use with detectors requiring battery current. To be placed in shunt with battery and detector. Over-all size,  $4\frac{1}{2} \times 2 \times 1\frac{1}{2}$  inches. Shipping weight,  $\frac{3}{4}$  lb.

## PRICE

Potentiometer No. 530 ..... \$2.00

The potentiometer gives an opportunity of properly regulating the current impressed upon the detector when detectors of the electrolytic, perikon, or carbonium types are used. Our No. 530 is a reliable, well-made instrument fully worth the low price asked. Like all Murdock Apparatus it has the distinctive appearance of good apparatus.

## CONNECTION BLOCK NO. 6B



**Detail:** hard rubber composition, with holes in ends for inserting wires or receiver cord tips; screw hole in center for attaching to table or cabinet; any number may be used in a row, interlocking themselves with screws in end blocks. Over-all size,  $1\frac{1}{2} \times \frac{3}{4} \times 1\frac{1}{8}$  inches. Shipping weight  $\frac{3}{4}$  lb.

## PRICE

Connection Block No. 6B, each ..... \$0.20

These blocks prove especially useful for connecting head receivers. Two sets may be connected to one block. Screwed on or under the operating desk with wiring brought from instruments and receivers attached to the block, they aid in making a station more workable. A series of blocks is useful also for bringing complicated wiring to a common distribution point.

## RECEIVING SET NO. 505



**Detail:** this set consists of, (1) our best receiving transformer, equal in sensitive selectivity to any amateur instrument ever made, and used by many commercial operators in preference to the apparatus furnished by their companies; (2) a 7-step loading inductance permitting tuning to 4000 meters in connection with an antenna of good size; (3) a primary variable condenser connected ordinarily in series with the primary of the receiving transformer to permit tuning to low waves; (4) a rotary variable secondary condenser connected in multiple allowing exceptional fineness of tuning in the secondary circuit for all average wave lengths; (5) a special rotary switch connecting the primary variable condenser to the secondary circuit, so that it may be instantaneously changed to a multiple connection with the secondary when required to tune up to 3000-4000 meters; (6) a patented, extra sensitive silicon detector, superior in many ways to the usual mineral detector; (7) a fixed condenser of suitable capacity, sealed in the detector base, for use as a "stopping" condenser in the telephone circuit; (8) a testing buzzer, battery, and push button for detector adjustment; (9) a pair of our best double-head receivers, complete with head band and cord, the equal in sensitiveness and all around efficiency of any 'phones ever made. All the instruments, with the exception of the receivers, are compactly mounted on a well-finished mahogany base, making a very handsome and compact unit, surpassed by none in appearance or efficiency. The set may be had either with or without a mahogany cover. Over-all size, 17 3/4 x 12 x 8 inches. Shipping weight, with cover, 28 lbs. Without cover, 23 lbs.

## PRICE

Receiving Set No. 505 . . . . .	\$50.00
Receiving Set No. 505 with cover . . . . .	55.00
Set only, no 'phones . . . . .	40.00
Set only, with 3000 ohm No. 55 'phones . . . . .	45.00

This receiving set combines every facility for the accurate and sensitive reception of signals over a very broad range of wave lengths and over distances dependent only upon the skill of the operator, the

size and location of the antenna, and the conditions of transmission. We have testimonials of its efficiency which credit it with performances equalling those of the best commercial apparatus. Distances up to 4000 miles over water have been reached under favorable conditions, while under average conditions, 1000 miles have been consistently covered. In every respect this set is high grade, and is fully worth the price asked.

#### AUDION RECEIVING SET NO. 506



**Detail:** see detail of Set No. 505. Set No. 506 has all instruments of Set No. 505 and in addition, (1) best quality audion detector, with high voltage battery and rheostat; (2) rotary switch, which permits change from silicon detector to audion and vice-versa. Over-all size, 18x12x9 inches. Shipping weight, with cover 30 lbs. Without cover, 25 lbs.

#### PRICE

Receiving Set No. 506 .....	\$80.00
Receiving Set No. 506, with cover .....	85.00
Set only, no 'phones .....	70.00
Set only, with 3000 ohm No. 55 'phones .....	75.00

This set is absolutely the best that may be obtained for experimental use and will be a source of keen pride and satisfaction to its owner. The addition of the audion detector to the already splendid combination of instruments means a sensitiveness of operation, the limits of which in reality depend only upon the power of the transmitting apparatus which is to be heard. In other words, Set No. 506 has everything possible to make it most responsive to signals, and, if there is energy enough in the antenna to operate any receiving instruments now known, it will be found that Set No. 506 will record the passage of the energy.

We use on Set No. 506, the very best grade of audion bulb which can be obtained, with special long-life filament, assuring to the purchaser of this set, maximum sensitiveness and a longer operating life than that possible with the ordinary audion bulb.

## ANTENNA INSULATORS



**Detail:** special moulded stock of great strength; shaped for maximum insulating efficiency; made in three sizes, suitable for all amateur installations. Ball-type, over-all length,  $3\frac{1}{4}$  inches; straight type, 4 inch, over-all  $5\frac{1}{2}$  inches, straight type 10 inch, over-all  $10\frac{1}{4}$  inches; shipping weights, No. 01,  $\frac{5}{8}$  lb.; No. 02,  $\frac{3}{4}$  lb.; No. 03, 1 lb.

## PRICES

	Each
No. 01, ball type	\$0.25
No. 02, 4 inch	.25
No. 03, 10 inch	.45

For the highest efficiency of any station, the antenna must be perfectly insulated. No better insulators in strength, shape or insulating properties can be obtained than those shown above. We advise the use of the ball type in all wire stretches for induction coil sets of small powers and receiving sets only. The 4 inch size is suitable for transformer sets of from  $\frac{1}{2}$  to 1 KW. The 10 inch size may be used whenever exceptional care is to be taken in insulating any part of the antenna. Insure the maximum efficiency of your set by careful insulation of your antenna with MURDOCK antenna insulators.

## ENTRANCE INSULATOR NO. 04

For the proper installation of the antenna leadin, an entrance insulator is required. We can supply a well designed insulator for this purpose which will answer perfectly all the requirements. This insulator is arranged so that it may be fastened in a window pane or in a hole in the woodwork. Shipping weight,  $\frac{3}{4}$  lb.

## PRICE

Entrance Insulator No. 04, each	\$1.50
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### ANTENNA WIRE

Our antenna wire is the best quality and is offered for the consideration of those who desire to secure dependable material at fair prices. Shipping weights: No. 14 copper, about  $1\frac{1}{2}$  lbs., to 100 ft.; No. 14 aluminum, about  $\frac{1}{2}$  lb., to 100 ft.; tinned copper, about 2 lbs., to 100 ft.; phosphor bronze, about  $1\frac{1}{2}$  lbs., to 100 ft.

No. 14, bare copper, per 100 ft.,	\$0.45
No. 14, aluminum, per 100 ft.,	.45
Tinned copper, 7 strands, No. 22, per 100 ft.,	.90
Phosphor bronze, 7 strands No. 22, per 100 ft.,	1.90

### ANTENNA SWITCH NO. 463



**Detail:** hardwood base, polished mahogany finish; hard rubber composition standard; rolled copper switch blades 8 inches long; means provided for breaking receiving circuit while transmitting. Over-all size,  $11\frac{1}{4} \times 5\frac{3}{4} \times 5\frac{1}{2}$  inches. Shipping weight,  $2\frac{1}{2}$  lbs.

PRICE	
Antenna Switch No. 463	\$3.00

This switch is designed to secure quick and positive change from receiving to transmitting and vice-versa. It is provided with three blades in the rear, affording a means of breaking the primary transmitting circuit while receiving, thus eliminating danger to operator or damage to receiving instruments through accidental touching of the transmitting key while switch is in the receiving position. This is a big, strongly constructed switch suitable for sets up to 1 KW and at the low price is decidedly the best investment that can be made.

## GROUND SWITCH NO. 467



**Detail:** regulation 100 ampere, slate base, single pole, double throw switch for connecting antenna to lightning ground. Required by underwriters. Offered in two sizes. Over-all size, No. 467A, 14x3x2½ inches; No. 467B, 18x4x3½ inches. Shipping weights, No. 467A, 5 lbs., No. 467B, 5½ lbs.

## PRICES

Lightning Switch No. 467A, 100 amperes, 250 volts, ....	\$3.00
Lightning Switch No. 467B, 100 amperes, 600 volts, ....	4.50

## INDUCTION COILS



**Detail:** polished quartered oak cases; non-stickable interrupters specially designed for wireless with platino iridium contacts; guaranteed to deliver rated spark length between needle points. Over-all sizes, No. 265, 9½x4½x5 inches, No. 266, and No. 267, 10½x5½x4½ inches. Shipping weights, No. 265, 9 lbs.; No. 266, 14 lbs.; No. 267, 15 lbs.

## PRICES

No. 265, 1 inch.....	\$5.40
No. 266, 1½ inch.....	8.00
No. 267, 2 inch.....	10.00
No. 268, 3 inch with separate primary condenser complete	21.00
No. 269, 4 inch with separate primary condenser complete	34.80

These induction coils are designed especially for wireless use, and will be found absolutely the best obtainable anywhere. They give in operation with the proper battery input and secondary condenser, a thick hot spark which indicates the certainty of effective radiation. They are well made in every respect and possess unrivaled efficiency in all around service.

We recommend for use with the various coils the following sets of battery. With No. 265, 4 to 6 cells; No. 266, 6 to 8; No. 267, 8 to 10; No. 268, 10 to 12, No. 269, 12. These cells should be connected in series.

For closed circuit capacities, we recommend the use of two sections of our Molded Condenser No. 483 in multiple, with Nos. 265, 266, and 267, and three sections in multiple for Nos. 268 and 269.

All coils excepting Nos. 268 and 269 are supplied with primary con-



Coil No. 268



Adjustable Primary Condenser for Coils 268, 269

denser in the case. Coils No. 268 and 269 are supplied with adjustable primary condenser in separate case as illustrated.

With sets properly tuned and with a good antenna, the No. 265 coil should transmit from 5 to 8 miles, No. 266, from 8 to 12 miles, No. 267, from 12 to 18 miles, No. 268, from 20 to 25 miles, No. 269, from 25 to 30 miles.

## FLEXIBLE TRANSMITTING TRANSFORMERS



**Detail:** Cast iron frame; air cooled; magnetic shunt; regulation device permitting ready change of input. Sizes: Type H-0, 1-5 amperes, 8x6x12 inches; type H-1, 2-8 amperes, 10x7x13 inches; type H-2, 3-12 amperes, 12x8x14 inches. Shipping weight, Type H-0, 50 lbs.; Type H-1, 60 lbs.; Type H-2, 80 lbs.

### PRICES

Type H-0, Flexible Transformer	.....	\$15.00
Type H-1, Flexible Transformer	.....	20.00
Type H-2, Flexible Transformer	.....	25.00

We have undertaken the sale of these transformers for the convenience of our customers, and with the confidence that they represent a good buy. The fact that we list them with our apparatus is testimony of our belief in their ability to give satisfactory service. The special feature of these transformers which should appeal forcibly to amateurs in general is the wide range of powers so conveniently available, thus enabling the operator to utilize the correct energy expenditure to suit prevailing conditions of communication.

We recommend for condenser capacity with these transformers our No. 483 condenser as follows, connections in multiple:

With Type H-0, 3 sections No. 483; Type H-1, 4 sections No. 483; Type H-2, 6 sections No. 483.

These recommendations are based upon the assumption that rotary or quenched gaps of proper design are used.

## MOULDED TRANSMITTING CONDENSER NO. 483



**Detail:** capacity per section .0017 mfd; copper foil sheets completely enclosed in a specially prepared dielectric compound; sections are extra strong physically and electrically; copper lugs, brass screws and nuts on connection posts; rack, dull black finish; brass bus bars; braided wire connectors. Sections may be had separately or in rack. Overall size unit section, 6 $\frac{1}{2}$  x 6 $\frac{1}{2}$  x 1 inches. Shipping weights, per section 3 lbs; rack only, 10 lbs; rack 4 section, 25 lbs.

## PRICES

Transmitting Condenser No. 483, per section, each	\$2.00
Rack only, smallest size, 4 section	5.00
Rack only, for each additional section up to 12, add	.50

The MURDOCK Moulded Transmitting Condenser is absolutely the most efficient condenser equipment obtainable for experimental use. Bureau of Standard tests show superiority over every form of condenser in ordinary use with less internal losses than the best plate glass or jar condenser. It is far preferable in convenience to oil immersed condensers. There is absolutely no brush in the moulded condenser, thus saving for radiation the 20 to 30 % energy which is expended in brush in the usual glass plate condenser.

The use of these condensers with rotary or quenched gaps is urgently recommended. The installation of the moulded condenser invariably results in a noticeably increased radiation. Therefore, coupling this advantage with that of ease and convenience of handling, it is difficult

to see why any other type of condenser should be used in amateur installations.

We suggest the following capacities of this condenser for amateur use, basing the suggestions upon the condition that no wave greater than 200 meters is to be used.

For induction coils up to 2 inch, 2 sections No. 483, in parallel.

For  $\frac{1}{4}$  KW transformer, 3 sections No. 483, in parallel.

For  $\frac{1}{2}$  KW transformer, 4 sections No. 483, in parallel.

For 1 KW transformer, 6 sections No. 483, in parallel.

In all probability, if the wave is to be kept at 200 meters or less, no greater capacity than .01 mfd., or 6 sections of No. 483 condenser in parallel could be used, with the possibility of a smaller amount being required, depending upon the inductance used in the primary circuit of the transmitter. We believe and recommend that rotary gaps with a spark discharge rate of about 1000 per second may be used with from 3 to 6 sections of No. 483 condenser in parallel and keep the radiation at 200 meters with good efficiency for powers up to 1 KW.

#### ANTENNA SERIES CONDENSER NO. 487



**Detail:** moulded condenser section supplied with three binding posts; special dielectric enveloping copper foil; practically unbreakable. This condenser gives virtually two condensers in one, permitting four changes in capacity, as the divisions are unequal. In use, the condenser is connected in series with the helix and the antenna. For the smallest capacity, connect to posts 1 and 3; for the second step, posts 1 and 2; for the third step, posts 2 and 3; then, if posts 1 and 3 be connected together, wires brought from 1 and 2 to their proper places on helix and antenna lead will give greatest capacity. Over-all size,  $6\frac{1}{2} \times 6\frac{1}{2} \times 1\frac{1}{2}$  inches. Shipping weight,  $3\frac{1}{4}$  lbs.

#### PRICE

Antenna Series Condenser No. 487	\$3.00
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A series condenser of this type offers a convenient method of cutting down the natural period of a long antenna so that 200 meter waves

may be transmitted with practically no loss of efficiency. It is compact and strong and will serve the purpose for which it is designed equally as well as any larger or more complicated series condenser.

As it is impossible to predict the precise capacity which may be required for different antennae, the recommendation is made that the different capacities as noted in the detailed description be tried. If the capacity of the antenna is exceptionally large, it may be found impossible to reduce the period as low as 200 meters. It may be said, however, that this condenser will be found perfectly satisfactory in connection with antennae having natural periods up to 400 meters. A distinct advantage to be gained by the use of this series condenser is the retention for receiving purposes of the efficient large antenna, and the correct tuning of the transmitted wave to the required 200 meters.

#### LINE PROTECTOR NO. 453



**Detail:** slate base; three resistance rods; two 15 ampere fuses to be connected across the line and grounded. Over-all size, 6x9x1½ inches. Shipping weight, 5 lbs.

#### PRICE

Line Protector No. 453	\$4.00
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The troublesome results of transformer "kickback" and inductive effects noted with transformer sets may be eliminated or minimized by the use of this protective device. The resistance rods oppose the flow of the low frequency primary current, yet offer a ready path to ground for high frequency "kickbacks." With care in installing and under all average conditions, this device offers almost certain protection for the instruments in the station. It has the advantage of being in service at all times. The use of a second protector in the power lines outside the station meter is recommended as the inductive effect on the lines from the antenna is frequently of intensity sufficient to damage the meter and wiring. This use of this instrument, with the permission of the power supply company, will afford protection to the meter and wiring which is really necessary, but which can be obtained by no other means.

## LINE PROTECTOR NO. 452



**Detail:** two 1 mfd. condensers in metal cases; double protective spark gaps; 3 ampere fuses; all mounted on light mahogany finished base. Over-all size, 10x7½x2¾ inches. Shipping weight, 7 lbs.

## PRICE

Line Protector No. 452 ..... \$5.00

This form of line protective device is preferred by many and is required by some power supply companies. It is as efficient as any device of the character can be made. The use of a line protector is urgently recommended with transformer sets of all powers. A protection of this character will frequently save many dollars worth of apparatus from the effects of "kickback" which at times cannot be accounted for.

## ROTARY SPARK GAP NO. 442



**Detail:** rotor, special moulded composition, 5 inch diameter; brass electrode arms with 12 zinc spark points; rotor mounted on motor shaft; two stationary zinc electrodes with knurled hard rubber composition adjusting handles; heavily nickelled supporting pillars; motor, Robbins and Myer Standard for 110 volt, 60 cycle AC or 110 volt DC, with variable speeds up to 8000 RPM. Base, mahogany finished. Over-all size, 10½x7x6½ inches. Shipping weight, complete gap, 15 lbs.; rotor and electrodes only 3 lbs.

## PRICE

<b>Rotary Gap No. 442, with R and M Standard Motor</b>	<b>\$17.50</b>
<b>Rotor and stationary electrodes only</b>	<b>5.00</b>
<b>R and M Standard Motor, as used with complete gap</b>	<b>12.50</b>

Rotary Gap No. 442 is distinctively a high quality instrument. It represents in materials and construction throughout, the highest ideals of amateur apparatus. The excellence of this motor is beyond question. The construction and materials of the rotor disc renders positive a correctly aligned, sweet-running, steady gap, one that will never warp or wobble. With this gap, a perfect musical note may be radiated with every signal clear-cut and distinct.

Rotors with stationary electrodes may be obtained separately. In ordering these parts to fit motors other than that noted above, please specify shaft size. We can furnish rotors with the following sized bushings,  $\frac{1}{4}$ ,  $\frac{1}{8}$  or  $\frac{1}{16}$  inch.

## ROTARY SPARK GAP NO. 443



**Detail:** rotor, moulded composition; sparking points, aluminum, twelve in number; stationary electrodes, aluminum, with ingenious adjustable feature; motor Knapp, for 110 volt current, either A.C. or D.C.; speed about 4000 RPM; mounted on mahogany base. Over-all size,  $10\frac{1}{2} \times 7\frac{1}{2} \times 7$  inches. Shipping weight, complete gap, 10 lbs; rotor and electrodes,  $1\frac{1}{4}$  lbs; rotor, electrodes and base, 4 lbs; motor, 6 lbs.

## PRICE

<b>Rotary Spark Gap No. 443, complete</b>	<b>\$9.50</b>
<b>Rotor and stationary electrodes only</b>	<b>2.75</b>
<b>Rotor and electrodes mounted on base</b>	<b>3.25</b>
<b>Motor only</b>	<b>6.50</b>

Rotors can be supplied to fit motor shafts  $\frac{1}{16}$ ,  $\frac{1}{8}$ ,  $\frac{1}{4}$  inches diameter.

This new gap presents many unique and desirable points of design which make it the most desirable gap ever offered at a price so low. It has an excellent, sturdy and substantial motor. Its rotor is abso-

lately true running, will never warp or wobble. The sparking surfaces of the rotor are integral with the arms projecting from the rotor and are so designed as to give a fan effect, greatly reducing the heating of the motor and the electrodes. The stationary electrodes are mounted so as to be instantly adjustable and to provide for the safety of the rotor in case of accidental striking of the rotor against an electrode projecting too far.

This instrument was designed to fill the demand for a gap of quality at a low price. We feel that this gap fills the need perfectly and we are sure that the operator who once adds this gap to his station will be enthusiastic about its quality of materials and its operation.

#### SPARK GAP NO. 440



**Detail:** hard rubber composition base; brass pillars and adjusting arms; knurled composition knobs; zinc spark points; large binding posts. Over-all size, 4½x2x2½ inches. Shipping weight, ¾ lb.

#### PRICE

<b>Spark Gap No. 440</b>	<b>\$0.75</b>
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A small, stationary gap suited for use with induction coil sets. It is thoroughly constructed, exceptionally good-looking and is far superior in every respect to the usual gap offered at a low price.

#### OSCILLATION TRANSFORMER NO. 424

**Detail:** variable coupling; primary, six turns and secondary eight turns edgewise wound copper strip; coupling varied by hingeing of secondary away from primary; mounted on mahogany finished base; four clips furnished. Over-all size, 10x7½x3½ inches. Shipping weight, 8 lbs.

There has been a keen desire on the part of amateurs in general for a variable coupling oscillation transformer which would permit the sharp tuning so necessary under present transmitting conditions. We believe that we have succeeded in placing at the command of these amateurs an exceptionally fine instrument of the type desired at a very low price. This new oscillation transformer No. 424, is not only suitable for battery sets, but is really designed for all powers up to 1 KW. It is big and sturdy, handsome and efficient and at its price has positively no rival in real value. This instrument will do well what appar-

atus of double the cost will do. It will last as long and serve efficiently every requirement. It will permit the precise tuning which is required by the radio law and which should be the ideal of every experimenter.



Oscillation Transformer No. 424

Do not determine on the purchase of a helix or an oscillation transformer of any kind until you have seen this instrument. We are sure that you will be satisfied that it is the best value you have ever seen.

**PRICE**

Oscillation Transformer No. 424 ..... \$4.00

**TRANSMITTING KEY NO. 283**



**Detail:** heavy brass base with large supporting pillars and strong key lever; contacts, coin silver,  $\frac{3}{4}$  inch diameter, even wearing and removable; lacquered finish. Over-all size,  $6 \times 2\frac{1}{8} \times 1\frac{1}{8}$  inches. Shipping weight, 1 lb.

**PRICE**

Transmitting Key No. 283 ..... \$4.50

This regulation wireless key will be found easy in action and thoroughly workmanlike. It is in every respect a high grade instrument. It may be used with safety and success for sets drawing up to 15 amperes.

## TRANSMITTING KEY NO. 284



**Detail:** Light wireless type; brass frame; copper current conducting strip; brass key lever; special large contacts. May be used with sets drawing up to 8 amperes. Over-all size, 5 $\frac{1}{4}$ x3x1 $\frac{3}{4}$  inches. Shipping weight, 1 lb.

**PRICE**

Transmitting Key No. 284..... \$1.65

This key is substantially constructed and represents an excellent value at a low price. It is a strictly wireless key based on the best telegraphic design and will prove very speedy and accurate in operation.

## TRANSMITTING KEY NO. 286



**Detail:** High grade marble base; flat brass lever with phosphor bronze spring; large coin silver contacts; all metal parts heavily nickel plated. Good for sets drawing up to 15 amperes. (Over-all size, 6x2x1 $\frac{1}{2}$  inches. Shipping weight, 3 lbs.

**PRICE**

Transmitting Key No. 286..... \$2.00

The easy, smooth and speedy action of this newly designed key is a matter of much favorable comment among operators. It is a key stripped of the complications of adjustment, a simplification of parts resulting in a perfection of operation which can be understood and appreciated only by actual use. We are frank in saying that we cannot see how expensive and complicated keys are in any way superior either in looks or in working to this exceptionally simple and serviceable instrument.

## TRANSMITTING KEY NO. 285



**Detail:** single lever; large contacts; specially designed spring device; hard rubber composition base; nickel plated binding posts. Good for spark coil sets of the smaller sizes. Over-all size,  $4\frac{1}{2} \times 2 \times 1\frac{1}{4}$  inches. Shipping weight,  $\frac{1}{2}$  lb.

## PRICE

Transmitting Key No. 285.....	\$0.50
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The average low priced key is never to be regarded as anything more than a "makeshift", cheaply gotten up and ruinously quick on its way to the junk heap. In offering this new low priced key, we assert without fear of contradiction, that its appearance excels all others of similar price, while its operation is positively more perfect and more accurate. For the experimenter who wants to get the most for his money, this key is the best obtainable.

## HOT WIRE METERS



**Detail:** three sizes offered, 0-5, 0-5 and 0-10 amperes; smaller sizes have nickel plated metal front with quadrant aperture for scale; No. 472, as illustrated, has heavy bevelled plate glass front; all sizes adjustable to zero reading. Nos. 470 and 471 measure three inches in diameter and No. 472, 4 inches. Shipping weight, Nos. 470 and 471, 1 lb; Nos. 472 and 473, 2 lbs.

## PRICES

Hot Wire Ammeter No. 470, 0-.5 amperes .....	\$5.00
Hot Wire Ammeter No. 471, 0-5 amperes .....	5.00
Hot Wire Ammeter No. 472, 0-10 amperes .....	10.00
Hot Wire Ammeter No. 473, 0-.5, amperes, special .....	10.00

The intelligent use of a hot wire ammeter for radiation readings is urgently recommended. Without such a measuring device, the real

operating efficiency of a station will be unknown, and the tuning of the transmitter will be mere guess work. The instruments offered herewith are thoroughly reliable, well constructed, and handsomely finished, and will prove of great value to any experimenter. We recommend the No. 470 for use with small induction coil sets, No. 471 for larger coil sets and transformers up to  $\frac{1}{4}$  KW. For safety and best results, No. 472 should be used with powers in excess of those mentioned. For use with wavemeters, we recommend No. 473, a special extra sensitive 0-5 instrument.

#### WAVEMETER NO. 521



**Detail:** Parts; variable condenser, glow lamp, spark gap, inductance. The condenser, lamp, and spark gap are mounted on the large mahogany base. The inductance is wound in a separate mahogany frame and is to be connected to the wavemeter proper by the flexible cord provided. Variable condenser is oil filled. Inductance has two windings, one for short wave lengths and other for long. The range of waves which can be measured is 175, 1100 meters. Chart of wave lengths and instructions for use supplied. The instrument is so wired that detector and phones may be used instead of lamp, or a milliammeter may be substituted. Over-all size, 10x7 $\frac{1}{2}$ x5 inches. Shipping weight, 10 lbs; with milliammeter, 12 lbs.

#### PRICE

Wavemeter No. 521, complete	\$10.00
Wavemeter No. 521, with hot wire milliammeter, best quality	20.00

This wavemeter possesses prominently an accuracy seldom obtained with amateur apparatus. It likewise affords a range of uses and wavelengths far beyond the powers of any similar instrument offered for amateur use. Its use will be found simple and reliable if intelligent observation and ordinary precautions are followed. The following brief suggestions as to its use will suggest the possibilities of this instrument which should be a part of the equipment of every amateur station.

To measure closed circuit waves of transmitting sets so as to tune to any desired wave length: Place the wavemeter inductance near the oscillation transformer or helix of the set to be measured, taking care that with higher powers it is not placed so close as to absorb energy enough to cause damage. The proper position must be found from experiment. Start at a distance and gradually approach source of

energy. As a general rule, sharpest readings will be obtained when inductance is removed far enough to exclude all energy except the amount just needed to register. Start transmitting set in operation on long dash. Vary condenser capacity on wavemeter. Watch glow lamp. When lamp is brightest, take condenser reading for that point as indicating wave length. Refer to plotted curve on chart and find wave length corresponding to condenser reading on scale of inductance coil in use.

To transmit a specific wave by means of the wavemeter and to calibrate receiving instruments therefrom: Remove lamp. Set condenser for desired wave. Attach small spark coil or buzzer operated by a few cells to spark gap and start in operation. Listen at receiving set as usual and note point where sound is strongest. This point may then be marked as the wave length transmitted by the wave meter. Other wave lengths may be transmitted in the same way.

For short waves from spark coils and low powered sets where the energy is small, detector and phones may be used for recognizing the transmitted wave, instead of glow lamp. For more exact results on high powered sets, a hot wire milliammeter may be used instead of the glow lamp.

#### Hints and cautions for use of wavemeter:

Always see that the inductance is connected to the posts "T.P."

When tuning transmitting station, using glow lamp as indicator, open spark gap. If using hot wire milliammeter, connect to spark gap posts, open gap, and remove lamp.

When using wavemeter as a transmitter with a spark coil, connect secondary of coil to spark gap, open gap a few thousandths of an inch, and remove lamp.

When using wavemeter as a transmitter with a buzzer, connect each side of buzzer break to spark gap posts, open gap and remove lamp.

When measuring lengths of incandescent waves, place inductance near receiving transformer, exact position to be determined by experiment. Keep lamp in place, and use detector and 'phones across posts "T.T."

This wavemeter excels in substantial construction and in accuracy of operation. It is in every way a splendidly designed and useful instrument, invaluable in experimental practice.

## RECEIVING AND TRANSMITTING COMBINATIONS

The several separate instruments illustrated and described on other pages of this catalog may be combined to make complete equipments which may be assembled and wired by the purchaser to suit his convenience. As merely suggestive of what combinations may be made, we list the following:

#### Receiving Combination No. 3.

Tuning Coil No. 240, Detector stand No. 324, Fixed Condenser No. 358 and double No. 55, 2000 ohm head set.

**Complete set** ..... \$8.00

<b>Receiving Combination No. 4.</b>	
Tuning Coil No. 240, Detector-Condenser No. 220, and double No. 55 head set.	
<b>Complete set . . . . .</b>	<b>\$10.50</b>
<b>Receiving Combination No. 5.</b>	
Receiving Transformer No. 344, Detector-Condenser No. 220, Rotary Variable Condenser No. 368, and double No. 55 head set.	
<b>Complete set . . . . .</b>	<b>\$17.50</b>
<b>Receiving Combination No. 6.</b>	
Receiving Transformer No. 341, Detector-Condenser No. 322, Rotary Variable Condensers No. 366 and 367, and double head receivers No. 55.	
<b>Complete set . . . . .</b>	<b>\$32.00</b>
<b>Transmitting Combination No. 260.</b>	
Induction Coil No. 265, Spark Gap No. 440, two sections Moulded Condenser No. 483, Oscillation Transformer No. 424, and Key No. 285.	
<b>Complete set . . . . .</b>	<b>\$14.65</b>
<b>Transmitting Combination No. 261.</b>	
Induction Coil No. 266 and other apparatus as in Set No. 260.	
<b>Complete set . . . . .</b>	<b>\$17.25</b>
<b>Transmitting Combination No. 262</b>	
Induction Coil No. 267 and other apparatus as in Set No. 260.	
<b>Complete set . . . . .</b>	<b>\$19.25</b>
<b>Transmitting Combination No. 411</b>	
1/4 KW Flexible transformer, three sections Moulded Condenser No. 483, Oscillation Transformer No. 424, Rotary Spark Gap No. 443, and Key No. 286.	
<b>Complete set . . . . .</b>	<b>\$36.50</b>
<b>Transmitting Combination No. 412</b>	
1/2 KW Flexible Transformer, four sections Moulded Condenser No. 483, Rotary Spark Gap No. 443, Oscillation Transformer No. 424, and Key No. 286.	
<b>Complete set . . . . .</b>	<b>\$43.50</b>
<b>Transmitting Combination No. 413.</b>	
1 KW Flexible Transformer, six sections Moulded Condenser No. 483, Rotary Spark Gap No. 443, Oscillation Transformer No. 424, and Key No. 286.	
<b>Complete set . . . . .</b>	<b>\$52.50</b>
<b>Transmitting Combination No. 414.</b>	
1 KW Flexible Transformer, six sections Moulded Condenser No. 483, Oscillation Transformer No. 424, Key No. 286, and Variable Speed Rotary Gap No. 442.	
<b>Complete set . . . . .</b>	<b>\$60.50</b>
Other instruments than those here listed may be used with these suggested combinations. By substituting the desired instrument and adding or deducting the difference in list price from the instrument for which substitution was made, the price of the desired combination may be ascertained.	

**PUSH BUTTON NO. 99**

**Detail:** black hard rubber composition button with white push centre; all parts permanently moulded in base. Over-all size,  $1\frac{3}{4} \times 1\frac{3}{4} \times \frac{1}{2}$  inches. Shipping weight,  $\frac{1}{2}$  lb.

**PRICE**

**Push Button No. 99 each, . . . . . \$0.15**

The best looking push button for use with any combination of electrical apparatus requiring such a device.

**CIRCUIT DETECTOR NO. 80**

**Patented**



**Detail:** special sensitive watchcase receiver furnished with a 7-foot cord and test tips; leather covered headband with long-life, small size dry cell in cylinder attached to band. Shipping weight, 1 lb.

PRICE	
MURDOCK Circuit Detector No. 80	\$3.00
Cell renewals each	.25

This is a circuit testing device which should be in every wireless station and in the kit of everybody who has any inclination to work with electrical appliances. It is a compact, sparsely, and convenient instrument, which will give positive solutions of all average circuit problems. It shows a complete circuit the instant the test tips are applied to the terminals. It aids in discovering shorts, grounds, etc., with the same speed and accuracy. It is invaluable as a time saver. It is always ready and will last for years, requiring only occasional cell renewals. It is worth a great deal to have such a device ready at hand at all times, with no fussing to do with magnetos, wiring or carrying big cells around. Simply put the receiver on the head and get busy.

#### THE INSTALLATION AND OPERATION OF MURDOCK APPARATUS

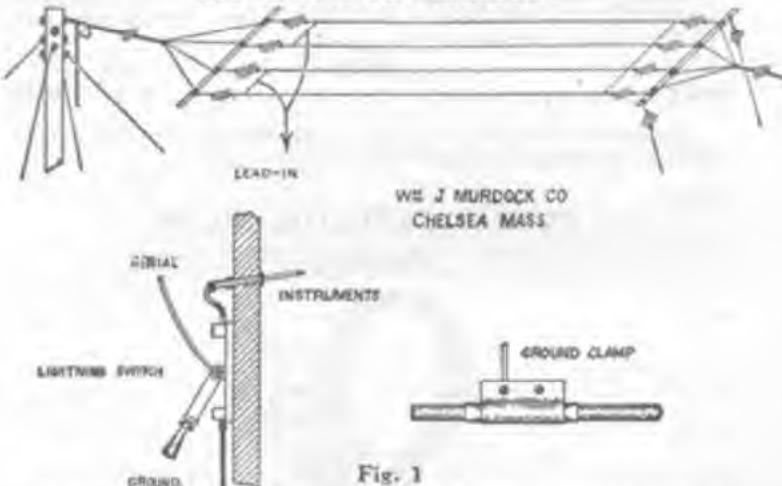


Fig. 1

It is the purpose of the following notes briefly to explain some of the requirements of a wireless station, together with some general hints relative to the installation and operation of the several instruments illustrated and described in this catalog. It is not intended that these brief notes be considered as comprehending the full knowledge required for expert operation. They are rather the initial suggestions defined for those with a limited acquaintance with wireless phenomena, to be supplemented by further study of proper authorities and the valuable information to be gained by actual practice.

## RADIO REGULATIONS

The operation of most amateur stations in the United States is subject to the regulations of the Act of August 12, 1912, as administered by officials of the Department of Commerce. Persons contemplating the installation of a wireless set are urged to secure the several governmental publications relating to the practice of wireless from the U. S. Radio Inspector of their district. Headquarters are at the Custom-houses of the following cities: Boston, New York, Baltimore, Savannah, New Orleans, San Francisco, Seattle, Cleveland and Chicago.

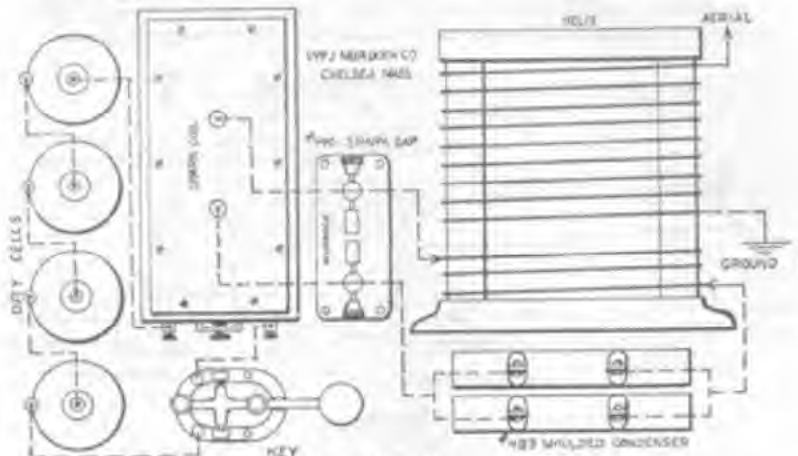


Fig. 2

In case of doubt as to your district, apply to the Commissioner of Navigation, Department of Commerce, Washington, D. C.

Following are enumerated in brief the principal regulations governing experimental stations.

No license is required for a receiving set only.

Licenses are required for all transmitting stations and for operators thereof, whenever the signals radiated cross the boundary of the state wherein the station is located, or where the emitted waves may interfere with the reception by another station of signals coming from without the state.

Amateur stations are restricted to a transmitting wave length of 200 meters, and a transformer input of 1 KW. Amateur stations located within five nautical miles of any naval or military radio station are restricted to a transformer input of  $\frac{1}{2}$  KW.

Section 19 of the Radio Law provides for the secrecy of messages.

received at any station. This applies to receiving stations only, though no license is required.

Full information regarding the law, and the necessary application forms for station and operators' licenses may be secured from the Radio Inspectors of the several districts without charge.

### THE ANTENNA

The primary requisite of a wireless station is the elevated grid of wires called the antenna. This is used for both transmitting and receiving, being alternately connected for either purpose by means of an antenna switch such as our No. 463. Fig. 1 shows a form of the favorite horizontal antenna and its details. Experimenters are not

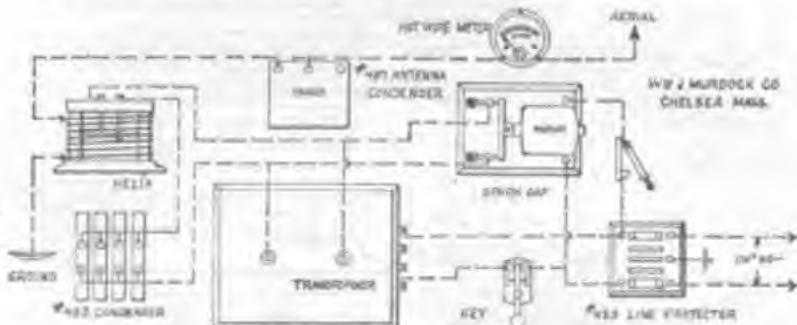


Fig. 3

necessarily restricted to this type, but it is easy to erect and is quite as efficient for general purposes as any other.

It may be said that the best results will be secured from the antenna which is elevated the highest and which has the greatest wire stretch. Thus, effective experimental antenna systems are from 50 to 100 feet in height, and from 75 to 250 feet in length, with from 4 to 6 wires in the stretches.

The total efficiency of the antenna will depend as much upon the care with which it is erected as upon its size. The wire used should be, preferably, copper not smaller than No. 14. Aluminum may be used but is not recommended. For long stretches or for any station where strength and good conductivity is desired, phosphor bronze wire will be found best.

Good insulation of the antenna is a prime necessity. Use Murdock Insulators throughout. No. 01 will serve effectively for small induction coil sets and for receiving sets only. Nos. 02 and 03 should be used with transformer sets. Fig. 1 shows the location of the insulators in the horizontal antenna.

### INSURANCE REGULATIONS

From the antenna, wires equal in number to those in the antenna stretches should be carried in a group to the lightning switch which should be placed on the outside of the building in an accessible location. Insurance regulations require on all stations having an outside antenna, this grounding switch which should be our No. 467. From this switch there should be carried to an earth outside the building, a copper wire, not less in size than No. 4, B & S gauge, run in as direct a line as possible. This switch should be thrown to the ground position at all times when the station is not in use. See Fig. 1 for connections of ground switch.

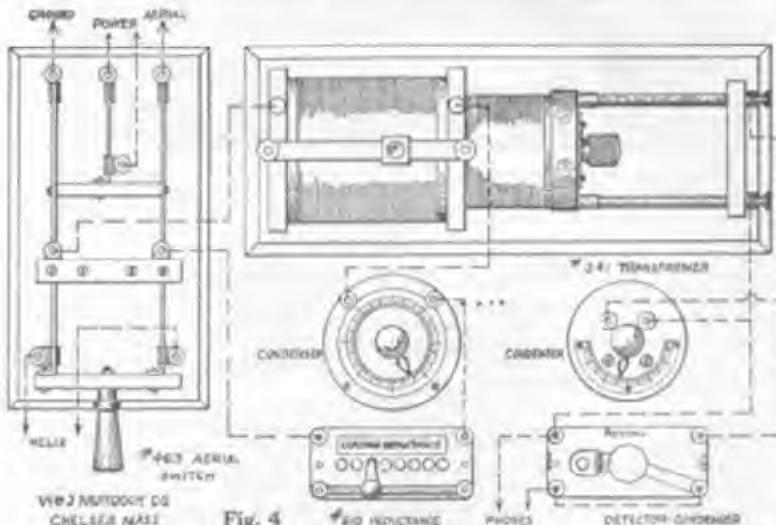


Fig. 4

This insurance regulation is merely a commendable precaution and should not be taken as an indication of positive danger from an antenna during electric storms. On the contrary, a well insulated and earthed antenna should prove a protection rather than a danger.

### THE LEADIN

From the lightning switch, a single large-sized, insulated wire should be brought into the station. This wire may be placed in an insulating tube in a hole in the wall or window sash. See Fig. 1 for detail. The leadin, inside the station should be connected to the antenna switch

as shown in the diagrams following, or in case of a receiving set only to the point indicated on the tuner.

### THE GROUND

The ground of the station itself should be near the apparatus and should be as perfect as possible. For average stations, a ground connection to a water pipe, as shown in Fig. 1, should be perfectly satisfactory. Where a water pipe system is not available, a good ground may be obtained by burying a large metal plate in permanently moist earth. It is quite as important to have a good ground as it is to have a large antenna.

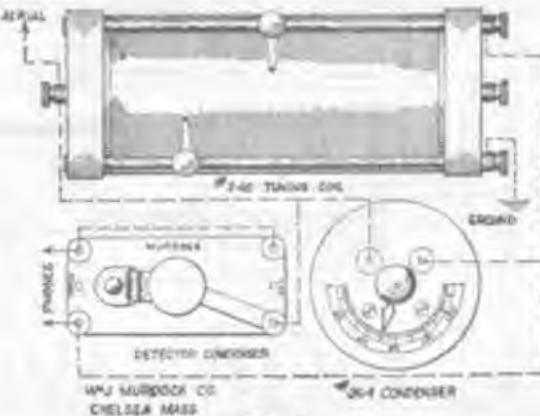


Fig. 5

### TRANSMITTING SETS

For the best results and for tuning such as is required by the Radio Law, it should be understood that all connectors in the transmitting circuit should be as short as possible and should be of large surface. When several separate instruments are combined to make a set, the positions of the instruments should be chosen with this fact in mind.

For a transmitting set the following instruments are required:  
 1. An induction coil or transformer; 2. a key; 3. A spark gap; 4. A transmitting condenser; 5. An oscillation transformer. There must be a source of current, in cases of induction coils, usually dry, or storage battery, and of transformers, commercial alternating current. Most transformers are designed for direct connection in 110 volt, 60 cycle lines. For the protection of instruments in sets using transformers it is advisable to use a line protector such as our No. 453.

The transmitting circuits are two in number, the closed and the open. The closed circuit includes the condenser, the spark gap, and the primary of the oscillation transformer. The open circuit comprises the secondary of the oscillation transformer and the antenna.

To tune a transmitting set, proceed as follows: First, tune the closed circuit to the desired wave length. For amateur stations, this must be 200 meters or less. The wave length of the closed circuit will depend upon the capacity of the condensers and the amount of inductance in the primary of the oscillation transformer. Unless this has been calculated, or is known, the wave length must be measured by means of a wave meter. The description of our Wavemeter No. 521 explains the operation of this instrument. When the wave length of the closed circuit has been adjusted to the desired point, the open circuit may then be put in resonance, that is, the wave period of both circuits will be the same. This is done by putting the set in operation and measuring the radiation by means of a hot wire meter such as our No. 470. When several changes of the secondary inductance have been made and several radiation readings have been secured, the highest reading may be taken as that of the tuned point, and the inductance adjustment may be placed at the point which gave the highest reading. When an antenna system is large, and has a natural period of more than 200 meters, the radiated wave may be brought within the limit by the use of our Antenna Series Condenser No. 487. The method of using this instrument is shown in Fig. 3 and is described in the preceding pages of the catalog.

The connections for the several instruments of an induction coil set are shown in Fig. 2 and for a transformer set in Fig. 3.

### RECEIVING SETS

When receiving sets such as our Nos. 505 and 506 are used, the only requirement for installation is the connection of the antenna and ground to the posts provided, as shown in Fig. 4. Separate instruments may be connected also in accordance with the same diagram, or in case of the double slide tuning coil as in Fig. 5.

Receiving expertness is gained almost wholly from experience, and the following suggestions are therefore very general.

First, adjust the detector to a sensitive condition while listening in the receivers for signals or for waves from a buzzer or other exciting device. On double slide tuners, such as our No. 240, the antenna slide may be moved to varying positions along the coil. When signals are picked up, the antenna and ground slides should both be adjusted until the signals are loudest in the receivers.

On sets using our Receiving Transformers Nos. 341 or 344, the primary slider should first be adjusted to the point giving the loudest sound. Then the secondary switch should be changed to correspond. Then, the coupling should be varied by moving the secondary in or out of the primary depending upon the volume of the sound and its original position. Lastly, the secondary condenser should be varied as to its capacity, until the signals reach their maximum, or until interference has been eliminated. For long waves, a loading inductance should be used in the primary circuit with a corresponding increase of capacity in the secondary. Remember that any change in either circuit must be balanced in the other circuit.

See Figs. 4 and 5 for receiving set connections.

## BOOKS FOR THE BEGINNER

ANY BOOK ON THIS PAGE 25 CENTS



Particularly valuable for notes on construction and erection of aerials, a point on which the amateur is sometimes weak.



Gives valuable pointers on bringing a station to high efficiency and keeping it there.



Contains latest call letters of all stations alphabetically, and more than 100 different diagrams of apparatus.



Thirty lessons, giving in detail much valuable instruction on various phases of wireless.

